WHAT IS CLAIMED IS:

1. A method of repairing tenons on the tips of turbine buckets, comprising the steps of:

(a) releasably securing a plurality of buckets to a fixture in predetermined positions;

(b) preheating the turbine buckets;

(c) applying weld material sequentially to the tips of the preheated buckets secured to the fixture in a first weld pass;

(d) applying additional weld material sequentially to the tips of the buckets secured to the fixture in at least one additional pass;

(e) stress-relieving the buckets; and

(f) machining the applied weld material to form tenons on the bucket tips.

2. A method according to Claim 1 wherein step (b) is performed by applying an induction heater coil to the buckets while the buckets are secured to the fixture.

3. A method according to Claim 1 wherein the fixture includes at least first and second groups of bucket positioning devices for securing first and second groups of said buckets, respectively, to the fixture in said predetermined positions, locating the first group of buckets secured to the fixture in said predetermined positions in a welding location relative to a welding

head to enable application of weld material sequentially to the tips of the first group of buckets and displacing the fixture to locate the second group of buckets secured to the fixture in said predetermined positions in said welding location relative to the welding head to enable application of weld material sequentially to the tips of the second group of buckets.

4. A method according to Claim 3 wherein the step of displacing includes rotating the fixture to align the bucket tips of the second group of buckets in said predetermined positions in said welding location for welding by the welding head.

5. A method according to Claim 3 including robotically advancing the welding head to apply weld material sequentially to the bucket tips of the respective first and second groups of buckets upon their location in said welding location.

6. A method according to Claim 1 including, prior to step (e), removing the buckets from the fixture and wherein step (e) includes disposing the bucket tips with the applied weld material into a fluidized bed to stress-relieve the buckets.

7. A method according to Claim 6 including inverting the buckets to orientations with the bucket tips facing downwardly, and wherein step (e) includes disposing the inverted buckets in a second fixture and lowering the inverted bucket tips carried by the second fixture into the fluidized bed.

8. A method according to Claim 1 wherein step (c) includes robotically controlling a welding head to apply the weld material sequentially to the tips of the bucket in each of said weld passes.

9. A method according to Claim 1 including monitoring the temperature of each bucket tip prior to applying the weld material thereto and controlling the application of the weld material to each tip to apply weld material only when the monitored temperature of the tip lies within a predetermined range of temperatures.

10. A method according to Claim 1 wherein the fixture includes at least first and second groups of bucket positioning devices for securing first and second groups of said buckets, respectively, to the fixture in said predetermined positions, preheating said first group of buckets, and simultaneously preheating said second group of buckets while applying the weld material sequentially to the preheated bucket tips of said first group of buckets.

11. A method according to Claim 1 including providing a robot having an arm carrying a welding head, robotically locating the welding head in a plurality of predetermined locations to apply the weld material sequentially to the bucket tips in said predetermined positions of said buckets during said first weld pass, and performing step (d) by robotically locating the welding head in said predetermined locations to apply the weld material sequentially to the bucket tips in said predetermined positions during said additional weld pass.

12. A method according to Claim 1 wherein step (a) includes clamping each bucket against a stop carried by the fixture to locate the bucket tips thereof relative to said fixture.

13. A method of repairing tenons on the tips of turbine buckets, comprising the steps of:

(a) fixing a plurality of buckets in predetermined positions;

(b) preheating the turbine buckets;

(c) applying weld material sequentially to the tips of the preheated buckets secured to the fixture in a first weld pass while said buckets are fixed in said predetermined positions;

(d) applying additional weld material sequentially to the tips of the buckets in at least one additional pass while said buckets are fixed in said predetermined positions;

(e)stress-relieving the buckets; and

(f)machining the applied weld material to form tenons on the bucket tips.

14. A method according to Claim 13 wherein step (b) is performed by applying an induction heater coil to the buckets while the buckets are secured to the fixture.

15. A method according to Claim 13 including robotically advancing a welding head to apply weld

material sequentially to the bucket tips of the buckets in each of the first and one additional weld passes.

16. A method according to Claim 13 including, prior to step (e), removing the buckets from their fixed positions and wherein step (e) includes disposing the bucket tips with the applied weld material into a fluidized bed to stress-relieve the buckets.

17. A method according to Claim 13 including monitoring the temperature of each bucket tip prior to applying the weld material thereto and controlling the application of the weld material to each tip to apply weld material only when the monitored temperature of the tip lies within a predetermined range of temperatures.

18. A method according to Claim 13 including providing a robot having an arm carrying a welding head, robotically locating the welding head in a plurality of predetermined locations to apply the weld material sequentially to the bucket tips in said predetermined positions of said buckets during said first weld pass, and performing step (d) by robotically locating the welding head in said predetermined locations to apply the weld material sequentially to the bucket tips in said predetermined positions during said additional weld pass.

19. An assembly for applying weld material to tips of turbine buckets to form one or more tenons on said bucket tips, comprising:

a fixture having clamps for releasably securing first and second groups of buckets in predetermined positions on said fixture;

an induction coil for preheating said groups of buckets;

a welding head for applying weld material to the tips of the buckets;

said fixture being movable between first and second positions, said fixture in said first position thereof locating said first group of buckets adjacent said weld head enabling weld material to be applied to the tips of the buckets thereof and said second group of buckets adjacent the induction coil for preheating the bucket tips thereof;

said fixture in said second position locating said second group of buckets adjacent said welding head, enabling weld material to be applied to the tips of the buckets of said second group thereof.

20. An assembly according to Claim 19 including a robot carrying said welding head and programmed to locate the welding heat in positions to apply weld material sequentially to the bucket tips of said groups of buckets.

21. An assembly according to Claim 19 including a temperature sensor for sensing the temperature of the preheated buckets and coupled to said robot to enable application of weld material to the bucket tips only upon

sensing a temperature in a predetermined range of temperatures.